

FEDERAL UNIVERSITY OF TECHNOLOGY, OWERRI
SCHOOL OF HEALTH TECHNOLOGY
DEPARTMENT OF BIOMEDICAL TECHNOLOGY
2013/2014 RAIN SEMESTER EXAMINATION

COURSE: BIOMEDICAL SYSTEM ANALYSIS
Instruction: Instruction: Answer any four questions

COURSE CODE: BMT 302
Time: 2hours

- 1(a) What do you understand by 'simulation tool'.
(b) State six (6) analytical tools for simulation of biomedical models.
(c) Solve non-linear biomedical model: $f(x) = 2x^3 - 7x + 2$. For the interval of $1 \leq x \leq 2$ with $\epsilon < 0.001$.
Using Newton's method.
(d) State with reason(s) the best method between regular - Falsi and Newton's method.

(Total: 20marks)

- 2(a) State (i) Secant model
(ii) Regular-Falsi model
(iii) Bisection model for simulation of non-linear model.
(b) Solve the biomedical models:

$$2x + 10y - z = 4$$

$$8x - y - z = 1$$

$$x + y - 5z = 3$$

Using Gaus - seidel numerical techniques with initial (0, 0, 0).

(Total: 20marks)

- 3(a) State six (6) sources of biomedical models.
(b) Solve non-linear biomedical model below:

$$x^2 + y^2 = -5.25$$

$$xy - xz = 0$$

$$xz + y^2 - 4z = -0.5$$

Using Newton-Raphson approach with initial values (1, 1, 1) for 1st iteration.

(Total: 20marks)

- 4(a) State four (4) finite difference schemes with their model and application regards to ODE.
(b) Solve (i) $y' = x + y$. Using forward difference scheme.
Given that $x(0) = 0$ and $y(0) = 0.8$ for range of $x = 0(0.4)2.0$.

(Total: 20marks)

- 5(a) State steps involves in solving first order ordinary differential equation using:
(i) Euler's method and (ii) Euler-Cauchy method.
(b) Solve $y' = x^2 - 4y$ using Euler method with $y(0) = 1, 0 < x < 1$ and $n = 5$.

(Total: 20marks)

- 6(a) State steps involves in solving Second order ordinary differential equation using:
(i) Euler-Cauchy method and
(ii) Runge - Kutta method.

- (b) State two advantages and one disadvantage for using each of the following in simulating biomedical system over one another:

(i) Euler's method

(ii) Runge - Kutta method.

(Total: 20marks)